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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/889,326	07/11/2001	Gerhard Hartwich	PATKRIPO2AUS	2316
20210	7590	05/31/2006	EXAMINER	
DAVIS & BUJOLD, P.L.L.C. FOURTH FLOOR 500 N. COMMERCIAL STREET MANCHESTER, NH 03101-1151			CALAMITA, HEATHER	
			ART UNIT	PAPER NUMBER
			1637	

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 09/889,326	Applicant(s) HARTWICH, GERHARD	
	Examiner Heather G. Calamita, Ph.D.	Art Unit 1637	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 21 March 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 127-150 and 152-197 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 127-150 and 152-197 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Status of Application, Amendments, and/or Claims*

1. Claims 127-150 and 152-197 are currently pending and under examination. Any objections and rejections not reiterated below are hereby withdrawn.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:  
  
The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 134-135 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 134-135 are indefinite over “reaction center of photosynthesizing organisms” and “reaction center of photosynthesizing bacteria” because it is not clear as to what in the reaction center (RC) of photosynthesizing organisms or bacteria is considered to be the redox-moiety. That is, it is not clear as to what structure or part of the RC is considered to be the donor and acceptor of the redox-moiety.

### *Claim Rejections - 35 USC § 102*

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 127-133 and 136-197 are rejected under 35 U.S.C. 102(e) as being anticipated by Bamdad et al. (USPN 6,541,617).

Regarding Claims 127 and 154-162, Bamdad et al. teaches a modified nucleic acid oligomer and a method of making said oligomer comprising a nucleic acid oligomer covalently attached to a single photoinducibly redox-active moiety, wherein the photoinducibly redox-active moiety comprises at least one electron-donor molecule and at least one electron-acceptor molecule, the at least one electron-donor molecule and the at least one electron-acceptor molecule not being joined by a nucleic acid oligomer. (See Figures 1 and 3-5, col. 5, 12-14, 20, 34-36, 41-42, 44-46, 52-56, and 61, where Bamdad discloses the Ruthenium bipyridine specifically at col. 60 lines 15-18)

Regarding Claims 128-129, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety comprises at least one redox-active moiety, linked, to at least one bimolecular electron-donor/electron-acceptor complex, at least one electron-donor molecule of the redox-active moiety and at least one electron-acceptor molecule of the redox-active moiety being joined with one another via one or more bonds (e.g., covalent bonds). (See Figures 1 and 3-5, col. 5, 12-14, 20, 34-36, 41-42, 44-46, 52-56, and 61)

Regarding Claims 130-133, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety comprises at least one redox-active moiety, linked, to at least one bimolecular electron-donor/electron-acceptor complex, at least one electron-donor molecule of the redox-active moiety and at least one electron-acceptor molecule of the redox-active moiety being covalently joined via one or more branched or linear molecular moieties of any composition and chain length (e.g., 1-14 atoms) and the redox-moiety additionally comprises one or more macromolecules. (See Figures 1 and 3-5, col. 5, 12-14, 20, 34-36, 41-42, 44-46, 52-56, and 61)

Regarding Claims 136-139, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and

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electron-acceptor molecules is a pigment, such as a flavin, a (metallo)porphyrin, a (metallo)chlorophyll, a (metallo)bacteriochlorophyll, or a derivative of these pigments, or wherein at least one of the electron-donor molecules and electron-acceptor molecules is a nicotinamide or a quinone (e.g., a pyrroloquinoline quinone (PQQ), a 1,2-benzoquinone, a 1,4-benzoquinone, a 1,2-naphthoquinone, a 1,4-naphthoquinone, a 9,10-anthraquinone, or one of their derivatives. (See cols. 41-42, for example)

Regarding Claims 140-142, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein at least one of the electron-donor molecules and electron-acceptor molecules is a charge transfer complex, such as a transition metal complex of Ru(II), Cr(III), Fe(II), Os(II), or Co(II). (See col. 42, for example).

Regarding Claims 143-144, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the modified nucleic acid oligomer can sequence-specifically bind single-strand DNA, RNA, and/or PNA, and wherein the modified nucleic acid oligomer is a deoxyribonucleic acid oligomer, a ribonucleic acid oligomer, or a peptide nucleic acid oligomer. (See col. 6-8 and 11-13, for example).

Regarding Claims 145-150, Bamdad teaches the nucleic acid oligomer according to claim 127, wherein the redox-active moiety is covalently bound to one of the phosphoric-acid groups, to one of the carboxylic-acid groups, to one of the amine groups, or to a sugar of the nucleic acid oligomer backbone, or wherein the redox-active moiety is covalently attached to a thiol group, a hydroxyl group, a carboxylic-acid group, or an amine group of a modified base of the nucleic acid oligomer, or wherein the reactive thiol, hydroxyl, carboxylic-acid, or amine group of the base is covalently bound to the base via a branched or linear molecular moiety of any composition and chain length, the shortest continuous link between the thiol, hydroxyl, carboxylic-acid, or amine group and the base being a branched or linear

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molecular moiety having a chain length of 1-14 atoms, or wherein the redox-active moiety is attached to an end of the nucleic acid oligomer backbone or to a terminal modified base. (See Figures 1 and 3-5, col. 6-7, 12-16, 20, 23, 32-38, 41-42, 44-46, 50, 52 and 61)

Regarding Claims 152-153, Bamdad teaches the modified nucleic acid oligomer according to claim 127, wherein the redox-active moiety is photoinducibly redox-active moiety, or a chemically-inducibly redox-active moiety, and wherein multiple redox-active moieties are attached to the nucleic acid oligomer. (See Figures 1 and 3-5, and cols. 41-44, for example).

Regarding Claims 163-170, Bamdad teaches a modified conductive surface, comprising at least one type of modified nucleic acid oligomer according to claim 127 attached to a conductive surface, wherein the surface is a metal or a metal alloy, wherein the surface is a metal selected from platinum, palladium, gold, cadmium, mercury, nickel, zinc, carbon, silver, copper, iron, lead, aluminum and manganese, semiconductor materials, etc.. (See col. 9, for example).

Regarding Claims 171-183, Bamdad teaches the various methods of attaching the nucleic acid oligomer to the conductive surface and the various modified conductive surfaces required by the claims. (See cols. 9-16 and 23-26, for example).

Regarding Claims 184-187, Bamdad teaches methods of producing the modified conductive surface. (See Figures 4-5 and cols. 9-13, 22-25 and 39-40, for example)

Regarding Claims 188-197, Bamdad teaches method of electrochemically detecting hybridization events. (See cols. 57-67, for example)

### *Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be

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patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 134-135 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bamdad et al. (USPN 6,541,617), as applied to Claims 127-133 and 136-197, in view of Haberle et al. (Laser in Forschung und Technik Vortage des Internationalen Kongresses; 12<sup>th</sup>, Munich, June 1995: 179-184).

The teachings of Bamdad are presented above. Bamdad teaches a modified nucleic acid oligomer comprising a nucleic acid oligomer attached to a single redox-active moiety, wherein the redox-active moiety comprises at least one electron-donor molecule and at least one electron-acceptor molecule, the at least one electron-donor molecule and the at least one electron-acceptor molecule not being joined by a nucleic acid oligomer. Bamdad does not teach the redox-moiety comprising the reaction center of photosynthesizing bacteria.

However, Haberle teaches the “ultrafast electron transfer in modified photosynthetic reaction centers from Rhodobacter sphaeroides” (see title and abstract). That is, Haberle teaches the electron transfer that occurs within a redox-moiety comprising the reaction center of photosynthesizing bacteria proceeds at an “ultrafast” rate.

Accordingly, in view of the teachings of Haberle, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Bamdad so as to have used a redox-moiety comprising the reaction center of photosynthesizing bacteria. One of ordinary skill in the art would have been motivated to modify the method of Bamdad in order to have achieved the benefit of providing a more efficient electron transfer reaction by utilizing the “ultrafast” means of electron transfer that occurs within a redox-moiety comprising the reaction center of photosynthesizing bacteria.

*Response to Arguments*

9. Applicant's arguments filed May 20, 2005 have been fully considered but they are not persuasive.

With regard to the 112 second paragraph rejections of claims 134 and 135, Applicant argues the amendment made to claim 135 obviates the rejection. This is not persuasive because the amendment made by Applicant does not address the 112 second paragraph rejections. The rejection asserts the recitation of "reaction center of photosynthesizing organisms" and "reaction center of photosynthesizing bacteria" is indefinite because it is not clear as to what in the reaction center (RC) of photosynthesizing organisms or bacteria is considered to be the redox-moiety. That is, it is not clear as to what structure or part of the RC is considered to be the donor and acceptor of the redox-moiety. This was not addressed or resolved by Applicants amendment.

With regard to the 102 rejections, Applicant argues Bamdad teach attaching microparticles to nucleic acid oligomers and an ETM is attached to the microparticle. An electron is transferred from an ETM via the nucleic acid to the electrode and that Bamdad uses multiple ETMs for an additive signal enhancement. Applicant argues this does not anticipate the instant claims because in the instant invention the electron is transferred from the donor to the acceptor within the redox-active moiety and then the electron is transferred from the acceptor to the nucleic acid and then finally to the electrode. This argument is not persuasive because Applicant is not claiming a method but a product. Applicant is arguing limitations not recited in the claim. Applicant is arguing whether or not Bamdad teach particular method steps in the transfer of electrons. This is irrelevant as Applicant has not claimed a method. Bamdad teach the elements of the product and as the claims recite the language of "comprising" it does not matter that the ETMs of Bamdad are attached to the nucleic acid through a microparticle. Further, Bamdad teach the complex of ruthenium bipyridine which is an electron donor and acceptor complex. Applicant additionally argues that Bamdad does not teach using a photoinducible redox-active moiety. This is not persuasive as Bamdad disclose a ruthenium bipyridine complex which is a photoinducible



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redox-active moiety. Bamdad teach this complex at col. 60 lines 15-18. Finally, Applicant seems to argue Bamdad do not teach the method of photoinducing electron transfer as used in the instant application. Again, whether Bamdad teach a method of photoinducing electron transfer is irrelevant as Applicant is not claiming a method. Bamdad teaches ruthenium bipyridine which is photoinducible, thus meeting the recited claim limitation.

With respect to the 103 rejections of claims 134 and 135, Applicant argues the combination of the base reference with the additional reference still fail to teach suggest or disclose the distinguishing features of the presently claimed invention. This argument is not persuasive because the teachings of Bamdad have been further clarified as to the application of the instant claims.

### *Conclusion*

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

### *Correspondence*

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather G. Calamita whose telephone number is 571.272.2876 and whose e-mail address is heather.calamita@uspto.gov. However, the office cannot guarantee security through the e-mail system

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nor should official papers be transmitted through this route. The examiner can normally be reached on Monday through Thursday, 7:00 AM to 5:30 PM.

If attempts to reach the examiner are unsuccessful, the examiner's supervisor, Gary Benzion can be reached at 571.272.0782.

Papers related to this application may be faxed to Group 1637 via the PTO Fax Center using the fax number 571.273.8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to 571.272.0547.

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JEFFREY FREDMAN  
PRIMARY EXAMINER

5/28/06